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## Record of Decision, Gillette South Coal Bed Methane Project Environmental Impact Statement

United States Department of the Interior Bureau of Land Management

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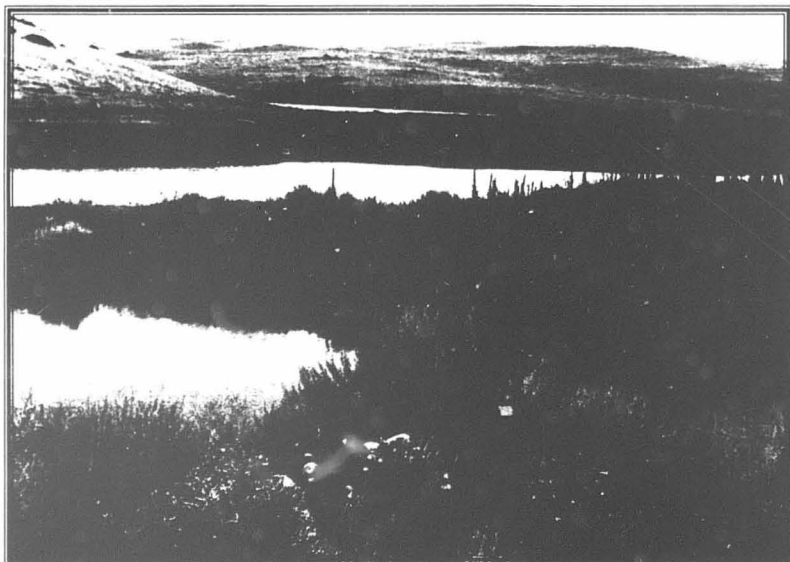
U.S. Department of the Interior  
Bureau of Land Management  
Casper District Office

Buffalo Resource Area

October 1997



# **RECORD OF DECISION** **Gillette South** **Coal Bed Methane Project** **Environmental Impact Statement**



98-006291



United States Department of the Interior

BUREAU OF LAND MANAGEMENT  
Wyoming State Office  
P.O. Box 1828  
Cheyenne, Wyoming 82003-1828

October 1997


Dear Reader:

This *Record of Decision (ROD)* for the *Gillette South Coal Bed Methane Project* is provided for your information and use. The Gillette South Coal Bed Methane assessment area is located in central Campbell County, Wyoming, within Twps. 42-49 N., Rgs. 70-73 W., 6th Principal Meridian. The area encompasses approximately 685 square miles of mixed federal, state, and private lands. The ROD outlines the decision and rationale for the Gillette South Coal Bed Methane Project. This decision is subject to appeal as explained in the ROD under "Appeal."

This ROD is the culmination of detailed analysis on the environmental effects of implementing the Proposed Action or alternatives. Based on the environmental analysis of the Proposed Action and alternatives documented in the *Gillette South Coal Bed Methane Project Draft Environmental Impact Statement (DEIS)*, February 1997, and the *Gillette South Coal Bed Methane Project Final Environmental Impact Statement (FEIS)*, August 1997, the BLM's decision incorporates restrictions and mitigation measures in consideration of federal, state, and local agencies, and public comments received on both the DEIS and FEIS. The decision allows the development of coal bed methane to meet public needs, while providing maximum consideration for protection of the natural environment, to result in the least degree of an irreversible or irretrievable commitment of natural resources and values.

The BLM appreciates the individuals, organizations, federal, state, and local governments who participated in the environmental analysis process. Your involvement has enhanced the integrity of the EIS and the public land manager's ability to make an informed decision.

Sincerely,

  
Alan R. Pierson  
State Director

Enclosure

(F)

DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
CASPER DISTRICT  
BUFFALO RESOURCE AREA

*RECORD OF DECISION*

*for the*

*GILLETTE SOUTH  
COAL BED METHANE PROJECT  
ENVIRONMENTAL IMPACT STATEMENT*

October 1997

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## INTRODUCTION

This document records the decision made by the Bureau of Land Management (BLM) for managing public land surface and federal mineral estate in the Gillette South Coal Bed Methane Project Area. The project area is located in Campbell County, Wyoming within Twps. 42-49 N., Rags. 70-73 W., 6th Principal Meridian. The project area encompasses approximately 685 square miles of mixed federal, state, and private lands.

The majority of private- and state-owned gas will be developed regardless of the outcome of the environmental impact statement (EIS), but under the Proposed Action the project will include production from private, state, and federal oil and gas properties. It is significant to note that although approximately 6% of the project area is federal surface; federal oil and gas ownership constitutes about 41% of the potential project area.

## DECISION

The BLM approves the Proposed Action for the development and production of coal bed methane on public lands. The decision approving the Proposed Action recognizes that there are other important natural resources and values within the area which require consideration and protection from unnecessary or undue degradation. Based on the environmental analysis of the Proposed Action and alternatives documented in the *Gillette South Coal Bed Methane Project Draft Environmental Impact Statement* (DEIS), February 1997, and the *Gillette South Coal Bed Methane Project Final Environmental Impact Statement* (FEIS), August 1997, the BLM's decision incorporates restrictions and mitigation measures in consideration of federal, state, and local agencies, and public comments received on both the DEIS and FEIS. The decision allows the development of coal bed methane to meet public needs, while providing maximum consideration for protection of the natural environment, resulting in the least amount of irreversible or irretrievable commitment of the natural resources and resource values.

This decision applies only to the federal mineral estate subject to administration by the BLM. All activities during the development, operation and production, and abandonment phases of the project will be conducted in compliance with all applicable federal, state and county laws, regulations, and stipulations. This decision is based on the EIS completed for the proposal. The EIS is guided by the BLM's *Buffalo Resource Area Resource Management Plan* (RMP) (USDI, BLM 1985), which describes the planning decisions for public land management within the Buffalo Resource Area. Comments received during the initial scoping period, the 45-day comment period for the DEIS, and the 30-day comment period for the FEIS were taken into consideration.

The environmentally preferred alternative for the Gillette South Coal Bed Methane project is the Proposed Action. The BLM believes that the Proposed Action complies with the National Environmental Policy Act's (NEPA) Section 101. The Proposed Action: (1) best meets the BLM statutory mission under the Mineral Leasing Act and the Federal Land Policy and Management Act; (2) identifies required mitigation which includes all reasonable and practicable



means to avoid or minimize environmental harm from the proposed development; (3) includes a monitoring program to ensure implementation and maintenance of necessary mitigation; (4) includes a requirement for operators to offer all affected landowners the water well agreement developed by the landowners and operators; and, (5) requires operators to form an organization which will consolidate all monitoring information into a common data base for the BLM and the Wyoming State Engineer and provide a yearly drawdown map from this information to the two agencies.

Approval of the Proposed Action and individual project components are subject to the administrative requirements and conditions of approval described in the draft and final EISs.

Approval of the Proposed Action and individual project components is conditioned upon and subject to the following pre-authorization administrative requirement: before any permit is issued authorizing an action on public lands (for example, application for permit to drill, sundry notice, or right-of-way), the final location for each well site, access road, pipeline, or other facility will be evaluated site-specifically through a categorical exclusion (CX), an administrative determination (AD), or an environmental assessment (EA) in accordance with the BLM's NEPA Handbook (H-1790-1). Documentation will be on BLM forms WY-1791-06 (CX), WY-1790-06 (AD), or WY-1792-08 (EA). In rare cases, a more in-depth EA than is provided for by use of form WY-1792-08 may be required to conduct the site-specific evaluation.

The DEIS, FEIS, and comment letters received on the FEIS may be reviewed by contacting the Area Manager, Buffalo Resource Area at the following address: BLM Area Manager, Buffalo Resource Area, 1425 Fort Street, Buffalo, Wyoming 82834. A limited number of copies of the DEIS and FEIS are available for distribution beyond those provided to parties on the DEIS and FEIS mailing lists.

### **APPROVED PROJECT (Proposed Action)**

This Record of Decision (ROD) enables the BLM Buffalo Resource Area Manager to approve the following project components to the extent they occur on federal minerals within the coal bed methane project area. Development beyond the specified levels will require the preparation of a supplemental environmental impact analysis.

The Proposed Action consists of drilling, completing, and operating approximately 400 coal bed methane wells in the eastern Powder River Basin of central Campbell County, Wyoming. Of these wells, a maximum of 190 will be located on lands where the oil and gas minerals are owned by the federal government (41% of the project area). These wells will be drilled by several companies over a three- to five-year period. Development will depend on the ability to compress and market the methane. Each application for permit to drill (APD) will be reviewed and approved on a case-by-case basis. This will allow the use of our monitoring data in developing conditions of approval for each coal bed methane well.

In addition to the new 400 proposed wells, the Proposed Action also analyzes the increased rate of development, the increased rate of production, the increased surface water discharge, and the increased area of disturbance from the Lighthouse (200 wells) and Marquiss (40 wells) EAs.

The coal bed methane wells will be located from 1 mile south of Gillette to 12 miles south of Wright, Wyoming. As stated under the "Location of the Proposed Action" in chapter 1 of the DEIS, the project boundary is delineated by industry interest; there is no legal requirement for companies to confine drilling to this area other than their federal oil and gas leases. Even without BLM approval, the majority of private- and state-owned gas will be developed, but under the Proposed Action the project will include production from private, state, and federal oil and gas properties.

The analysis area is approximately 685 square miles (438,284 acres); average well density if the entire area is developed will be 0.6 to 0.8 wells per square mile. Because the wells tend to occur in groups or pods depending on the structure of the coal seam and are usually drilled on a 40-acre spacing, large portions of the project area will never see any activity. Developed areas may see up to 16 wells per square mile because of the 40-acre spacing. Drilling will be by small truck-mounted water well rigs. The drilling and completion of a well will require no more than seven people at a time. Eight to ten of these rigs may be running at any one time including logging and cementing rigs. Drilling operations will disturb approximately a 100- by 100-foot area for a drill pad. A temporary mud pit of no more than 8 feet deep, 10 feet wide, and 20 feet long is normally required for each drilling and completion operation. If wells are air drilled, no mud pit will be constructed. Each producing well will be drilled to between a 350- and 1,200-foot depth and will have casing cemented to the top of the coal seam. Access to the wells will normally be by two-track road. Some roads would be upgraded at a later date if erosional problems occur.

The BLM has a general policy that requires access roads to oil and gas wells on federal lands to be crowned, ditched, and in most cases graveled or otherwise surfaced. For methane development, an exception may be made to this policy in consideration of the following factors.

- (1) The wells will be drilled using a water well rig.
- (2) After wells are completed and equipment is installed, travel to the wells will be generally limited to one visit per day in a light truck or utility vehicle to check on operations, read meters, and provide light service.
- (3) Such trips will be rescheduled or postponed during infrequent periods of wet weather when vehicular traffic could cause rutting. For some projects, wells will be tied into a central processing location adjacent to an all-weather road, thus eliminating daily trips to individual wells.
- (4) Troublesome areas, such as drainage crossings, will be upgraded as the need arises. Because the terrain in this area is flat, very little earthwork will be required in access road

construction. Most of the access roads are on privately owned lands, and the owners have expressed a desire to have surface disturbance, including road construction, minimized.

Based on the foregoing, the Proposed Action does not include crowned, ditched, and surfaced roads such as BLM requires in conventional oil and gas operations unless required to prevent erosional problems when identified. The conditions of approval developed during the APD approval process will guide what types of mitigating measures are required for access road development.

The project will occur through time as companies develop their various proposals. The drilling activity will correspond to an estimated three- to five-year timeframe. A certain number of wells will be drilled and hooked up to pipelines each year. Company projections indicate that between 50 and 100 wells could be drilled in any given year, with about one-half are likely to be federal wells. We estimate that no more than 190 wells will be drilled on federal minerals with a similar number being drilled on private and state minerals. Lower numbers of wells being drilled could result from various economic factors that would cause companies to limit activity resulting in as few as 200 total wells or 100 federal wells. The estimated productive life of the project is 10 to 20 years. A study conducted by the BLM indicates an estimated average well life of 12 years (USF, BLM 1996).

The Proposed Action will consist of four basic components: a) the CBM wells; b) the gas gathering and delivery system; c) the water disposal system; and, d) the hydrologic monitoring system. These components are described below.

### **Coal Bed Methane Wells**

Coal bed methane will be produced by drilling wells at selected locations in the Wyodak coal seam. This is the same seam that is being mined by 11 active surface coal mines in or adjacent to the assessment area. These coal mines are located along the outcrop of the coal seam where the relatively thin overburden is conducive to surface mining.

It will be necessary to pump water until the associated pressure decline in the coal bed is sufficient for methane to begin to flow into the well bore. In some wells, free methane will occur and water will not need to be pumped initially. Methane will be produced until reserves decline to subeconomic levels of methane production. Production from each coal bed methane well is estimated to range from 50 to 500 thousand cubic feet (mcf) per day when the wells achieve optimal production.

The coal bed methane wells will be located on anticlinal (dome-shaped) structures of the coal where free methane may exist in traps or where minimal pressure reductions are required to begin methane production. These structures in the coal are target coal bed methane production sites because their shape provides natural traps for gas in the coal seam, and the structures are often associated with enhanced fracture permeability in the coal seam. This allows economic recovery of methane with fewer wells and reduced water production.

The coal bed methane well bores will be uncased in the coal. The wells will be cased and cemented from the land surface to the top of the coal seam to prevent hydraulic communication (connection) through the well bore between the coal seam and the overlying Wasatch Formation. An unknown percentage of the proposed wells will require the installation of submersible pumps which will be used to produce water as necessary to lower the pressure in the coal seam, thus permitting methane to displace the water in the fractures (or cleats) in the coal seam and become available for recovery in the well. Other coal bed methane wells will encounter free gas under pressure allowing the gas to be produced by flowing to the surface in tubing installed in the well bore. Wells encountering free gas will not require pump installation. Production of water is variable with initial production averaging 15 to 25 gallons per minute (gpm) and declining to 5 to 20 gpm depending on the well location within the coal seam. Production is expected to average no more than 20 gpm per well.

Development progression will depend on where company interest lies and the possibility of lease expirations. Typical well distribution will be a grouping or "pod" of approximately 25 to 50 wells. Within each "pod" two basic development scenarios have evolved. One scenario ties two or more wells to a central gathering facility where the produced gas and water are separated. From this facility the gas will be transferred by buried pipeline to a central processing plant and thence to the pipeline. The second scenario has a water/gas separator at each well location. The gas is transferred by buried pipeline to a central processing plant and then to the pipeline. The first scenario will minimize the size of surface facilities used at the wellhead and lessen the visual intrusion on the landscape.

It is estimated that seven processing facilities will need to be constructed to handle the estimated production and sales. Incoming gas will be metered and then will flow into the gas line toward the compressor. Incoming water not removed at the production point will be separated from the gas and will be directed toward a permitted discharge point.

Each well, upon completion and evaluation, will be tested for use as a methane production well. If found suitable, each well will be equipped with the following:

- ▶ a submersible pump (about one to five horsepower) to depressure the coal seam by evacuating sufficient water to initiate gas flow;
- ▶ a water-gas separator; and,
- ▶ piping and fittings necessary to connect the wellhead with discharge lines to convey water to discharge facilities and gas to a compressor station.

If a well is not found suitable for production, it will be plugged and abandoned according to BLM and Wyoming Oil and Gas Conservation Commission (WOGCC) standards.

Power lines and water and gas lines used to connect production wells with facilities will be buried in trenches wherever possible. The gas and water lines will be laid in a trench

approximately six feet deep. Electric lines may be laid in the same trench at a two-foot depth. Power to each well will be provided by Powder River Energy Corporation.

### **Gas Gathering and Delivery System**

The gas gathering and delivery system will consist of black polyethylene pipe one and one-half to eight inches in diameter extending from each well to a compressor station which will compress the gas for delivery to a high-pressure gas transmission line. The gas line from the coal bed methane wells to the compressor station will be installed using a ditch-witch or similar vehicle.

The pipeline will be assembled outside of the trench. After the pipeline is assembled and laid in the trench, the dirt will be bladed back into the trench and mounded to allow for settlement. The total width of disturbance along the trench will be less than 10 feet.

The proposed project will require construction of gas compressor facilities. Assuming one compressor plant will be constructed and operated by Western Gas Resources, Incorporated or KN Energy, Incorporated. Assuming that one compressor plant will be required for each pod of 50 to 60 wells, up to seven compressor facilities will be required for the projected 400 wells. Each of the compressor plants will be rated at between 800 and 1,400 horsepower and will be tied into large-diameter pipelines that already exist in the project area. Each compressor station will occupy approximately one and one-half acres.

### **Water Disposal System**

The water which must be pumped from the coal bed methane wells to initiate gas flow will be disposed of by discharging it to area drainages after it passes through the water/gas separators. This disposal method has been used successfully and with little or no adverse impact at the Rawhide Butte coal bed methane project northwest of Gillette, the Marquiss project, and in the developed portions of the Lighthouse project.

To the extent possible, the water discharge lines from each well will be placed into the same trench as the gas gathering lines to minimize construction costs and surface disturbance. The water discharge lines, like the low-pressure gas lines, will be two- to four-inch diameter poly pipe depending on how many wells can be networked into the same line. The discharge lines will be networked such that several wells are linked together to one common discharge point. As has been done at the Marquiss, Lighthouse, and Rawhide Butte projects, discharge points will be selected after consultation with the landowners to find locations which will provide maximum benefits and with the BLM and Wyoming Department of Environmental Quality (WDEQ) to avoid sites which will result in adverse impacts.

The receiving drainages will be tributaries to the Belle Fourche and Cheyenne rivers. The discharged water will most likely be distributed to approximately 80 points (or five wells per discharge point). Assuming an average maximum of 20 gpm per well, the discharge at any point should not exceed 100 gpm.

### **Hydrologic Monitoring System**

An integral part of the Proposed Action is a hydrologic monitoring system required to detect impacts to other water users and to provide data for control and operation of the methane production project. The monitoring program will include groundwater and surface water monitoring in addition to the monitoring required under the terms of the National Pollution Discharge Elimination System (NPDES) discharge permit issued by the state of Wyoming. The monitoring program was designed to provide early warning if nearby water wells are susceptible to unacceptable loss in hydraulic head as a result of coal bed methane development activities.

Whether production of methane occurs by encountering free gas trapped in the coal seam or by pumping water to reduce pressure and induce gas flow, it is possible that nearby water wells completed in the coal may experience a decline in head (for example, an increase in the depth to water in the well bore). If the decline in head is a significant part of the total available head at a particular water well, then that water well may experience a reduction in yield.

Monitoring has been occurring on the Lighthouse and Marquiss projects to validate predicted impacts and to identify the need to mitigate impacts. This monitoring will be continued and expanded to cover the Gillette South assessment area and will be in line with the Water Well Agreement worked out by the landowners and the operators (see the appendix in the DEIS).

### **Specific Monitoring Activities**

**Groundwater.** The following monitoring will be required of the various operators. The data will be submitted to the BLM as well as the appropriate state agency (Wyoming State Engineer's Office--WYSEO, WDEQ, etc.).

- ▶ Baseline static water levels, productive capacity, and methane gas concentration: all properly permitted water wells within the circle of influence (COI) as defined by the Water Well Agreement located in the appendix of the DEIS.
- ▶ Quarterly monitoring of selected wells within and around the project area. The coal bed methane operator will be required to submit a monitoring plan to the BLM.
- ▶ Periodic monitoring of static water levels in coal bed methane production wells as required by the WYSEO. It is expected that the WYSEO will require the operator to submit monthly reports containing the following information in addition to static water level measurements for each coal bed methane well: (a) well name, permit number, and location; (b) reporting dates, name of individual responsible for report, and method of measurement; (c) total volumes of water and gas produced during the reporting period and cumulatively since reporting began; (d) bottom of hole pressure build-up during a minimum 8-hour shut-in period once every 45 days; and, (e) remarks or comments regarding data acquisition. These reporting requirements were established by the WYSEO for coal bed methane projects.

- Cumulative monitoring of water production at each coal bed methane production well.

The following is the monitoring to be done as a result of the Marquiss, Lighthouse, and Gillette South coal bed methane projects by the BLM to provide independent verification of hydrologic activities. Depending on federal budget availability, it may become necessary for the coal bed methane operators to pay for some or all of this monitoring through cost reimbursement. This has not been necessary throughout the initial Marquiss and Lighthouse projects.

- Continuous monitoring of groundwater levels and gas pressure of selected wells completed in the coal and periodic (one to two months) measurement of methane concentration at these wells. In addition, several of these monitoring sites will include additional well(s) completed in the next shallower sand(s) above the coal near the coal well (less than 300 feet). Some of the well sets include a coal completion well and a well completed in the next sand below the coal. Existing monitor wells are shown in table 1; wells proposed for installation in 1997 and beyond as part of the Lighthouse project are shown in table 2. The additional wells planned as part of the Gillette South project are shown in table 3. The proposed locations are approximate, and siting will depend on field conditions and development.

If adequate existing wells are available they may be substituted for some of the wells above (or possibly added to the network). Additional wells will be required with the additional development proposed in the FEIS. It is anticipated that the ratio of monitoring wells required to the number of wells drilled will remain the same as for the currently permitted activity (one monitor well per 10 to 15 coal bed methane wells or approximately one well set per township). Monitoring well schedule and final location will ultimately be a function of the final development scenario and development schedule.

- Periodic spot checking of measurements made by operators on their monitoring wells.
- Periodic (one to two times per year) monitoring of additional water wells that operators are not monitoring further from the project area.
- Water quality samples will be taken from the monitoring wells on a semi-annual basis and analyzed for the constituents on page 9.
- At least one multi-well aquifer test will be run to validate the assumptions of aquifer anisotropy and aquifer characteristics presented in this FEIS. This test, or aquifer characterization study, will be completed in 1997.
- **Additional Monitoring Wells**

BLM will convert additional stratigraphic test holes to monitoring wells as stratigraphic testing moves into areas which currently lack monitoring wells. Costs and scheduling will be negotiated on a well-by-well basis.

| PARAMETER               | UNIT      |
|-------------------------|-----------|
| pH                      | Std Units |
| Electrical conductivity | umhos/cm  |
| Bicarbonate             | mg/l      |
| Chloride                | mg/l      |
| Sulfate                 | mg/l      |
| Carbonate               | mg/l      |
| Fluoride                | mg/l      |
| Calcium                 | mg/l      |
| Potassium               | mg/l      |
| Magnesium               | mg/l      |
| Sodium                  | mg/l      |
| Aluminum                | µg/l      |
| Arsenic                 | µg/l      |
| Barium                  | µg/l      |
| Boron                   | µg/l      |
| Cadmium                 | µg/l      |
| Chromium                | µg/l      |
| Copper                  | µg/l      |
| Iron                    | µg/l      |
| Lead                    | µg/l      |
| Mercury                 | µg/l      |
| Selenium                | µg/l      |
| Silica                  | µg/l      |
| Silver                  | µg/l      |
| Zinc                    | µg/l      |

**TABLE 1  
EXISTING MONITORING WELLS**

| WELL LOCATION                       | DEPTH (feet below land surface) | ZONE OF COMPLETION (feet) | STATE OF WYOMING PERMIT NUMBER | COMMENTS                                                                       |
|-------------------------------------|---------------------------------|---------------------------|--------------------------------|--------------------------------------------------------------------------------|
| T. 48 N., R. 72 W. SWSE, section 22 | 510                             | coal<br>430 - 510         | completed 2-6-93 (U.W. 90658)  | Coal well of a pair of wells completed for the Marquiss project.               |
| T. 48 N., R. 72 W. SWSW, section 22 | 410                             | sand<br>340 - 410         | completed 2-6-93 (U.W. 90659)  | Sand well of well pair.                                                        |
| T. 47 N., R. 72 W. SWNW, section 2  | 407                             | coal<br>327 - 407         | completed 4-1-93 (U.W. 90656)  | Coal well of a pair of wells completed for the Marquiss project.               |
| T. 47 N., R. 72 W. SWNW, section 2  | 310                             | sand<br>260 - 310         | completed 4-1-93 (U.W. 90657)  | Sand well of well pair.                                                        |
| T. 47 N., R. 72 W. SWNW, section 36 | 500                             | coal                      | NONE                           | Existing (Amoco well).                                                         |
| T. 47 N., R. 71 W. SWSW, section 19 | 392                             | coal<br>337-387           | existing (P82851W)             | Existing (Cordero well).                                                       |
| T. 46 N., R. 72 W. section 16       | 800 (approx.)                   | coal                      | existing                       | Use this existing American well for monitoring or until needed for production. |
| T. 46 N., R. 72 W. NESW, section 6  | 359                             | coal<br>313-353           | existing (P82852W)             | Existing (Cordero well).                                                       |
| T. 46 N., R. 72 W. SWSW, section 25 | 525                             | coal<br>420-525           | completed 11-96                | Coal well of pair.                                                             |
| T. 46 N., R. 72 W. SWSW, section 25 | 175                             | sand<br>140-170           | completed 11-96                | Sand well of pair.                                                             |
| T. 45 N., R. 75 W. NESW, section 31 | 1648                            | coal<br>1459-1559         | existing (P88746W)             | Shogrin Federal #2 acquired from Exxon 11-96.                                  |

**TABLE 2  
PLANNED LIGHTHOUSE DEDICATED MONITORING WELLS**

| WELL LOCATION                                                    | TARGET ZONE OF COMPLETION | COMMENTS                                                                                                           |
|------------------------------------------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------|
| SW¼NW¼, Sec. 36<br>T. 46 N., R. 72 W.                            | Wyodak/Anderson Coal      | Coal well of pair. This well will be drilled to replace the production well currently used for monitoring.         |
| SW¼NW¼, Sec. 36<br>T. 46 N., R. 72 W.                            | Sand zone above coal      | Sand well of pair. Well would be completed in the sand zone closest to the top of the coal.                        |
| SE¼SE¼, Sec. 31<br>T. 46 N., R. 72 W.                            | Wyodak/Anderson Coal      | Coal well of pair.                                                                                                 |
| SE¼SE¼, Sec. 31<br>T. 45 N., R. 72 W.                            | Sand zone above coal      | Sand well of pair. Well would be completed in the sand zone closest to the top of the coal.                        |
| NW¼SW¼, Sec. 23<br>T. 45 N., R. 72 W.                            | Wyodak/Anderson Coal      | Coal well of pair.                                                                                                 |
| NW¼SE¼, Sec. 23<br>T. 45 N., R. 72 W.                            | Sand zone above coal      | Sand well of pair. Well would be completed in the sand zone closest to the top of the coal.                        |
| SW¼SW¼, Sec. 30<br>T. 44 N., R. 71 W.                            | Wyodak/Anderson Coal      | Coal well of triple.                                                                                               |
| SW¼SW¼, Sec. 30<br>T. 44 N., R. 71 W.                            | Sand zone above coal      | Sand well of triple. Well would be completed in the sand zone closest to the top of the coal.                      |
| SW¼SW¼, Sec. 30 ¼<br>T. 44 N., R. 71 W.                          | Sand zone below coal      | Sand well of triple. Well would be completed in the sand zone closest to the bottom of the coal.                   |
| Sec. 7, T. 44 N., R. 72 W.<br>OR:<br>Sec. 14, T. 44 N., R. 73 W. | Wyodak/Anderson Coal      | Coal well of pair. This well pair would be developed at a later date as development moves in a westward direction. |
| Sec. 7, T. 44 N., R. 72 W.<br>OR:<br>Sec. 14, T. 44 N., R. 73 W. | Sand zone above coal      | Sand well of pair. This well pair would be developed at a later date as development moves in a westward direction. |

**TABLE 3**  
**PLANNED GILLETTE SOUTH DEDICATED MONITORING WELLS**

| WELL LOCATION                                             | TARGET ZONE OF COMPLETION | COMMENTS                             |
|-----------------------------------------------------------|---------------------------|--------------------------------------|
| Sec. 36, T. 49 N., R. 73 W.                               | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 2, T. 47 N., R. 72 W.                                | Wasatch Sand              | Complete at existing well pair site. |
| Sec. 7, T. 47 N., R. 73 W.                                | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 16, T. 47 N., R. 73 W.                               | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 11, T. 46 N., R. 74 W.                               | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 16, T. 45 N., R. 74 W.                               | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 21, T. 45 N., R. 73 W. or Sec. 6, T. 44 N., R. 73 W. | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 36, T. 45 N., R. 72 W.                               | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 36, T. 45 N., R. 71 W.                               | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 36, T. 43 N., R. 74 W.                               | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 16, T. 43 N., R. 72 W.                               | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 21, T. 43 N., R. 71 W.                               | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 36, T. 42 N., R. 74 W.                               | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 32, T. 42 N., R. 73 W.                               | Wyodak / Anderson Coal    | Coal/sand well set*.                 |
| Sec. 29, T. 41 N., R. 72 W.                               | Wyodak / Anderson Coal    | Coal/sand well set*.                 |

\*"Well set" includes one coal completion plus one or more sand wells.

**Surface Water.** The monitoring below will be required of the operators:

- ▶ Monitoring of volume and quality of produced water being discharged to the surface as required by the WDEQ under the NPDES.
- ▶ Additional surface water stations may be required on Black Thunder Creek, Coal Creek, Little Thunder Creek, and/or Porcupine Creek and/or their tributaries. This will depend on the location of discharge points, availability of existing data, and magnitude of projected impact. The cost of this monitoring will have to be shared by the BLM and the

coal bed methane operators. With the projected BLM budgets, it is anticipated that the operators will have to shoulder the bulk of this cost.

The following monitoring will be done by the BLM:

- ▶ Operation of a surface water gauging station on the Belle Fourche River below the area to be affected by surface discharge of produced water from the assessment area and above the areas influenced by the coal mines. In addition, a station is currently being operated on Caballo Creek by the Cordero Mine.
- ▶ At the Belle Fourche station, stream flow, water temperature, and electrical conductivity of the water will be continuously recorded. In addition, periodic manually collected samples will be analyzed for the constituents listed previously with the addition of total suspended sediments (TSS).
- ▶ Periodic check sampling of water quality will be done at the assessment area discharge points and analyzed as above.
- ▶ Channels receiving the produced water will be monitored for signs of accelerated erosion and degradation.

**Cost Share on Wells to be Monitored by BLM.** Where suitable wells do not exist for monitoring, operators will be required to obtain access, permit, drill, and properly complete wells (including casing, screen where appropriate, sand pack where appropriate, logging, and cementing) where necessary, in relation to their projects. The BLM will provide and install all instrumentation and necessary support facilities (shelter and fence).

**Implementation of Monitoring.** As individual operators propose projects, monitoring needs will be assessed to ensure sufficient data is gathered through monitoring so drawdown impacts can be tracked. Table 3 identifies currently planned monitoring wells for the Gillette South project. As drilling proceeds additional monitoring wells will be identified and added to the monitoring network.

The well locations and scheduling in tables 2 and 3 are approximate. If adequate existing wells are available they may be substituted for some of the wells (or possibly added to the network). The monitoring well schedule and final location will ultimately be a function of the final development scenario and development schedule.

## ALTERNATIVES CONSIDERED BUT NOT ANALYZED IN DETAIL

### Restrict Timing on Approval of Federal Wells

This alternative considered slowing the rate of approval for 190 federal wells. It was not analyzed in detail because there is enough flexibility in implementing the Proposed Action to



regulate the timing of approval for the 190 federal wells. The decision to approve each well is based on the site-specific analysis completed for each APD. The rate at which federal wells are approved could be slowed down, but the mix of mineral ownership in the assessment area would lead to proportionally more wells being drilled on private and state leases to make up for the reduced number of federal wells approved. This could lead to drainage of federal gas. Impacts of this alternative would be less than the Proposed Action if total fewer wells are actually drilled over time. If more private and state wells are drilled to compensate for the slower rate at which federal wells are approved, impacts would be the same as the Proposed Action. For this reason, this alternative has not been analyzed in detail.

#### **Reduce the Number of Federal Wells Approved**

This alternative considered the drilling of fewer than 190 federal wells in a sequential manner. It was not analyzed in detail because there is enough flexibility in the implementation of the Proposed Action to approve fewer than 190 federal wells. Additionally, the mix of mineral ownership in the assessment area (41% federal minerals) would lead to proportionally more wells being drilled on private and state leases to make up for the reduced number of federal wells approved. To approve fewer than 190 federal wells could lead to a drainage of federal gas. Impacts of this alternative would be less than the Proposed Action if the total number of wells drilled was less than 400. If private and state leases are developed at an increased rate to compensate for fewer federal wells being approved, the impacts would be the same as the Proposed Action. For this reason, this alternative was not analyzed in detail.

The following two alternatives are not true alternatives to the Proposed Action; rather, they are variations to how water disposal is handled. They are included in response to scoping comments and comments made on the DEIS.

#### **Change the Method of Surface Water Disposal**

Drilling and production would be the same as that described under the Proposed Action, but surface water disposal methods would be modified. This alternative was not analyzed in detail because current water discharges in three existing projects (which have been producing coal bed methane for up to seven years) have not caused any major problems. Also, discharges are regulated by the state of Wyoming under NPDES, and the produced water from this project would meet those standards.

#### **Inject Produced Water Underground**

Drilling and production would be the same as that described under the Proposed Action, but produced water would be injected underground. Produced water from existing projects has been of relatively good quality. Total dissolved solid (TDS) levels have been from 500 to 1,000 milligrams per liter (mg/l), well within Wyoming standards for livestock water. The produced water can only be disposed of in aquifers exempt from the definition of fresh and potable water (WOGCC 1989). Injection of this water into an exempt formation would make water now

suitable for irrigation and livestock unusable for any future use and would only mitigate potential surface water impacts and none of the potential groundwater impacts. ReInjection into the coal seam might be feasible but would also defeat the purpose of removing water from the coal seam to produce methane. Also, reinjection would require a system of wells and pipelines that would increase the total surface disturbance. Finally, because the produced water is suitable for livestock and wildlife and possibly irrigation, it should be put to beneficial uses rather than injected into an aquifer of lesser quality.

#### **THE NO ACTION ALTERNATIVE**

The No Action Alternative would be to reject all applications for federal wells. 40CFR 1502.14(d) of the Council on Environmental Quality (CEQ) regulations requires that alternatives analyzed in the EIS "include the alternative of no action." The Department of the Interior's authority to implement a No Action alternative is limited. An explanation of this limitation and the discretion the Department has in this regard is as follows.

An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits" in the leased lands, subject to the terms and conditions incorporated in the lease (form 3110-2). Because the Secretary of the Interior has the authority and responsibility to protect the environment within federal oil and gas leases, restrictions are imposed on the lease terms.

Leases within the assessment area contain various stipulations concerning surface disturbance, surface occupancy, and limited surface use. In addition, the lease stipulations provide that the Department of the Interior may impose "such reasonable conditions, not inconsistent with the purposes for which the lease is issued, as the BLM may require to protect the surface of these leased lands and environment." None of the stipulations would empower the Secretary of the Interior to deny all drilling activity because of environmental concerns.

Provisions in leases that expressly provide Secretarial authority to deny or restrict APD development in whole or in part would depend on an opinion provided by the U.S. Fish and Wildlife Service (FWS) regarding impacts to endangered or threatened species or habitats of plants or animals that are listed or proposed for listing (for example, bald eagle). If the FWS concludes that the Proposed Action and alternatives would likely jeopardize the continued existence of any endangered or threatened plant or animal species, then the APD(s) and related development may be denied in whole or in part on the federal leases. Development could still proceed on the private and state leases.

#### **MITIGATION MEASURES**

##### **Water Resources**

**Groundwater.** If mitigation of groundwater impacts is required, two options are available. One option is implementation of the Water Well Agreement between the operator and the affected

landowner. (Please see the appendix in the DEIS.) The Water Well Agreement addresses monitoring of any properly permitted water well which falls within the circle of influence of a coal bed methane production well. This COI is defined as a ½-mile radius around a CBM well. The Water Well Agreement also addresses how the COI will be expanded, should there be interference with a water well within the COI. If no water well falls within the initial COI, the COI will be expanded to the next nearest water well. Impaired wells can be restored by reconfiguring, redrilling, installing a new well, or by other means such as hauling in water.

The main effect of the predicted loss in hydraulic head associated with the Proposed Action is to temporarily reduce or eliminate the available head in nearby water supply wells that are completed in the coal. A second option is to mitigate these impacts in accordance with state water law. This will occur if water levels drop below the lowest point of diversion in the vicinity of the well and well yields are reduced below historic production levels. Mitigation under state law will be developed by the BLM in consultation with the Wyoming State Engineer, the affected landowner, and the operator on a case-by-case basis. Possible ways in which mitigation will be accomplished at the cost of the operator are: temporary replacement with commercially purchased water, with water produced by the operator, or, by reimbursing a well owner for increased pumping costs associated with a greater lift. Permanent replacement will be done by drilling a replacement well.

As part of the APD approval process, the BLM will require operators to offer landowners the Water Well Agreement. If landowners refuse to accept the Water Well Agreement, the second option for water well mitigation will be used.

Through the independent groundwater monitoring program being carried out by the BLM, information on the drawdown of the static well level within the coal seam and status of the sand aquifers is being obtained and tracked. This information will enable the BLM to determine potential impacts. The information, however, could be greatly supplemented if all of the monitoring information being gathered by the operators were brought into one common data base. The coal operators are carrying out this type of activity through a group called the Gillette Area Groundwater Monitoring Organization (GAGMO).

The CBM operators do report to the WYSEO on an individual basis, but it is time restrictive for the WYSEO to combine individual operator reports and plot combined drawdown curves. Combining the CBM operator information with that gathered by the BLM and the coal operators would provide a comprehensive picture of what is happening.

Because impacts to groundwater are of the highest concern in the assessment area, CBM operators on federal minerals will be required to form a group similar to GAGMO for the purpose of providing a common reporting method and data base of their monitoring results. This group will be required to provide a yearly combined drawdown map of the results of their CBM activity. This information, along with the raw data, will be furnished to the BLM and the WYSEO.

**Surface Water.** Discharge points from federal wells will be approved by a qualified hydrologist to ensure channel stability. The channel will be inspected for signs of accelerated erosion, and appropriate mitigation will take place as necessary.

## COMPLIANCE AND MONITORING

Actions BLM will take and actions required by the operators have been spelled out in the Proposed Action and in the "Mitigation Measures" section. BLM and the WYSEO will be responsible to ensure these actions are carried out.

## MANAGEMENT CONSIDERATIONS/RATIONALE FOR DECISIONS

The decision to approve the Proposed Action takes into account the fact that it helps meet public needs for natural gas while at the same time resulting in the least degree of irreversible, irretrievable commitment of resources.

The decision to approve the field development Proposed Action is based on careful consideration of a number of factors, including the following: (1) consistency with land use and resource management plans; (2) public involvement, scoping issues, and EIS comments; (3) relevant resource and economic considerations; (4) agency statutory requirements; (5) national policy; and, (6) measures to avoid or minimize environmental harm.

### Consistency with Land Use and Resource Management Plans

The decision to authorize the Proposed Action is in conformance with the overall planning direction for the area. The Buffalo Resource Area Resource Management Plan (USDI, BLM 1985) provides that oil and gas exploration and development will be authorized in accordance with lease provisions. Lease constraints and development will be subject to land use decisions described in the "Planning Decisions" section of the RMP Record of Decision.

### Public Involvement, Scoping Issues, and EIS Comments

**Scoping Process.** The CEQ regulations require an "early and open process for determining the scope of issues to be addressed and for identifying significant issues related to a Proposed Action" (40 CFR 1501.7). Scoping was conducted through a direct mail process and public meetings. The mailing list included landowners, business groups, environmental groups, and any other interested members of the public.

Public scoping meetings were held on March 12, 1996 at the Casper District Office and on March 25, 1996 at the Holiday Inn in Gillette. All substantive comments BLM received during these meetings have been used to direct the scope and analysis of the draft and final EIS. Public scoping comments were accepted through April 8, 1996, and a decision letter stating the BLM's intent to prepare an EIS was sent to the agencies and publics on the mailing list on May 7, 1996. The notice to prepare an EIS appeared in the *Federal Register* on May 28, 1996.



Additional meetings were held to develop a hydrologic mitigation plan on December 13, 1995 and January 23, 1996 at the Towers West in Gillette. These first two meetings included potentially affected landowners, federal and state agency personnel, and six coal bed methane development companies. A working group of affected landowners and industry representatives was formed from those two meetings to address the hydrologic issues of water well drawdown. Meetings of this group continued through September 1996. These meetings resulted in the Water Well Agreement in the appendix of the DEIS.

**Public Review of Draft EIS.** On March 28, 1997, the Environmental Protection Agency's Notice of Availability was published in the *Federal Register*. Over 450 copies of the draft EIS were made available to the public and interested agencies for a 45-day public comment period. The date by which the comments had to be received was May 12, 1997. On April 18, 1997, a Notice of Availability was published in the *Federal Register*.

**Draft EIS Comments.** A total of 12 comment letters were received during the 45-day public comment period provided on the draft EIS.

Responses to public comments received on the DEIS are included in the FEIS and are summarized here to assist the reader of this document.

Major issues of public concern were as follows.

- **People were concerned with the loss of hydraulic head related to groundwater associated with the coal seam. Concerns related to lowering of water levels and increased pumping costs because water would have to be pumped from greater depths.**

Prior environmental documents and the Gillette South FEIS all predicted that the hydraulic head of water in wells completed in the coal seam would be temporarily reduced or eliminated with the coal bed methane activity. The Wyoming State Engineer's Office has instituted monitoring requirements of the CBM operators as part of their water well permit process. The BLM has instituted an independent monitoring program to track what is happening in both the coal seam and the aquifers above and below the coal. This information and the formation of a combined data base required by this ROD will enable BLM and the WYSEO to develop a comprehensive picture of what is occurring. To deal with the adverse impacts to water wells, a water well agreement will be required to be offered to all affected landowners by the operators as part of this ROD. If a landowner chooses not to sign the water well agreement, state of Wyoming water law will prevail.

- **Concerns were voiced on how the differentiation would be made between coal mine-caused and coal bed methane-caused impacts to the lowering of the water in the coal seam. How would the responsible entity be identified?**

This ROD commits BLM to doing additional monitoring in the Gillette South assessment area to delineate what is occurring as part of the drawdown. This ROD also requires the operators to form a groundwater monitoring group which will be required to provide a yearly drawdown map and furnish their monitoring results to the BLM and the WYSEO.

- **Questions were posed on what effects the Proposed Action would have on air quality. Of concern were possible hazardous emissions and pollutants released as a result of compressor emissions.**

The gas analysis of the methane indicated no hazardous emissions were present from either the gas itself or the compressor station emissions. Modeling was done to analyze the impacts of nitrous oxides and carbon monoxide from the compressor stations. No significant impacts were identified.

- **Disposing water on the surface raised concerns about water quality due to possible increased erosion and possible weed infestations because of water flow fluctuations.**

Discharged water is actually of better quality than surface runoff water. The possibility of increased erosion will be addressed by selecting discharge points where channels are stable. Coal bed methane operations do not normally experience water flow fluctuations, but as part of normal permitting, operators are required to control weed infestations.

- **Questions were raised about the use of produced water for dust control, stock watering, and the creation of wetlands. What were the ramifications of using this water in this manner?**

Dust control is a practice required to meet air quality standards. This is considered a beneficial use of the water by the WYSEO if the water is appropriated for this purpose. Stock watering and the creation of wetlands once the water has been discharged by the operator are appropriate uses of the water. Wetlands created by the discharge do not come under the jurisdiction of the U.S. Army Corps of Engineers or the FWS. Only if a wetland is enhanced and then impacted do these agencies have an input.

- **Concern was voiced that the mines had been venting methane for years and now we had companies working to recover the methane and pay royalty on production. Were we going to make the mines pay back royalty and future royalty for the methane they vent?**

Coal bed methane development in the Powder River Basin is a relatively new technology. Before this technology was developed, there was no way to recover the methane which was vented to the atmosphere as a result of coal mining. As coal bed methane technology develops, oil and gas companies are moving to recover the methane before mining. The mining probably has a beneficial impact on the successful recovery of the methane. The question of requiring royalty payments by the mines has not been addressed at this time.

- **Commentors were concerned that we had not done further modeling to predict possible drawdowns and impacts.**

When the BLM was doing scoping to determine what type of NEPA documentation we would do for the Gillette South area we disclosed to the public that we would not do any further modeling. Our reasoning for not doing any additional modeling was that from experience with existing models it was not feasible to credibly or accurately model an area as large as the Gillette South assessment area with existing data. As variables increase, accuracy decreases to the point where the model predictions become meaningless. BLM used what information we had. We obtained the 15-year report from the Gillette Area Groundwater Monitoring Organization (GAGMO) to show what was happening as a result of mining.

- **Concern was voiced about the use of the 1988 CHIA (*Cumulative Potential Hydrologic Impacts of Surface Coal Mining in the Eastern Powder River Structural Basin, Northeastern Wyoming*) and how this affected cumulative impacts.**

We used what information we had available to analyze the cumulative impacts to groundwater. We incorporated the 1988 CHIA, the Lighthouse Model, the GAGMO 15-year report, and monitoring information from the BLM dedicated monitoring wells.

- **Concerns were voiced that previous documents had underestimated the magnitude of impacts when in actuality we had underestimated rate of impact occurrence.**

The error on the impacts caused by the Marquiss and Lighthouse projects was not in total impact but rather in the rate at which the impact occurred. We assumed a drilling and discharge rate that was commensurate with that ongoing at the time of our analysis. The development and discharge rates increased as technology evolved and development rates increased. This resulted in impacts occurring faster than predicted. This will not change the predicted magnitude of impacts.

- **Concerns were raised that we had not addressed impacts to threatened and endangered species, raptors, and fisheries.**

Evidence of the threatened swift fox has been documented in the EIS assessment area by the U.S. Forest Service. BLM, in conjunction with the Forest Service, will carry out additional inventories. BLM, in conjunction with the Wyoming Game and Fish, did inventory raptors nests in the assessment area and will monitor identified nests as development occurs. As part of the project development, fisheries will be enhanced.

**Final EIS Comments.** A total of four comment letters were received during the 30-day public comment period provided on the final EIS. These letters and responses to substantive comments are included as part of this ROD. Comments containing only opinions or preferences did not receive a formal response; however, they were considered as part of the decisionmaking process.

Major issues of public concern on the final EIS were as follows.

- People were concerned we would not do further groundwater modeling to predict the extent of CBM effects and the overlap with coal development.
- Concern was expressed about the effects of surface disposal of water and operating a ranch with ongoing methane development operations.

**Agency Statutory Requirements.** The decision is consistent with all federal, state, and county authorizing actions required to implement the Proposed Action. All pertinent statutory requirements applicable to this proposal were considered. These include consultation with the FWS regarding threatened, endangered, and candidate species; consultation with the Army Corp of Engineers; and, coordination with the state of Wyoming regarding wildlife, environmental quality, and oil and gas conservation.

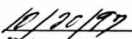
**National Policy.** Private exploration and development of federal oil and gas leases is an integral part of the BLM oil and gas leasing program under authority of the Mineral Leasing Act of 1920 and the Federal Land Policy and Management Act of 1976. Therefore, the decision is consistent with national policy.

## APPEAL

This decision may be appealed to the Interior Board of Land Appeals, Office of the Secretary, in accordance with the regulations contained in 43 CFR 3165.4(c). If an appeal is filed, your notice of appeal must be filed in this office (Bureau of Land Management, State Director, P.O. Box 1828, Cheyenne, Wyoming 82003) within 30 days of the date BLM issues their notice of the decision. The appellant has the burden of showing that the decision appealed from is in error.

If you wish to file a petition (pursuant to regulation 43 CFR 3165.4(c) for a stay (suspension) of the effectiveness of this decision during the time that your appeal is being reviewed by the Board, the petition for a stay must accompany your notice of appeal. A petition for a stay is required to show sufficient justification based on the standards listed in 43 CFR 3165.4(c). Copies of the notice of appeal and petition for a stay must also be submitted to the Interior Board of Land Appeals and to the appropriate office of the Solicitor at the same time the original documents are filed with this office. If you request a stay, you have the burden of proof to demonstrate that a stay should be granted.

  
State Director

  
Date

## REFERENCES

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**United States. Department of the Interior. Bureau of Land Management.**

1985 *Buffalo Resource Management Plan/Record of Decision*. Buffalo, WY.

1996 "Review of Production from Shallow Gas Wells Completed in the Fort Union Formation, South Gillette Area, T. 47-48 N., R. 72 W., Campbell County, Wyoming." Report prepared by J. David Chase and Frederick Crockett of the BLM's Reservoir Management Group. Report is on file at the Casper District Office, Casper, WY.

**Wyoming Oil and Gas Conservation Commission (WOGCC).**

1989 Rule No. 336.

## APPENDIX

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### COMMENT LETTERS RECEIVED ON THE FINAL EIS

The following four comment letters were submitted by the public and interested agencies during the 30 day comment period on the Gillette South Coal Bed Methane Project Final EIS. All comment letters received have been reproduced in this appendix with each letter given a unique identifying number. Comments containing only opinions or preferences did not receive a formal response; however, they were considered as part of the BLM decisionmaking process. Substantive comments requiring a response are identified by comment number associated with heavy vertical lines in the margin of each letter. For instance, comment 3-2 is the second comment on comment letter number 3 requiring a response.

97 SEP -8 PM 12:52

**Kennecott  
Energy**

August 29, 1997

Mr. Richard Zander  
BLM-Buffalo Resource Area Office  
1425 Fort Street  
Buffalo, WY 82834

Re: Final Environmental Impact Statement: Gillette South Coal Bed Methane  
Project

Dear Mr. Zander:

In Wyoming, Kennecott Energy Company provides management services to the Antelope Mine, Caballo Rojo Mine, Cordero Mine, Fort Union Mine and Kennecott Uranium Company. On behalf of those coal operations, located within or near the delineated Gillette South assessment area, the following comments are submitted.

Kennecott Energy Company appreciates the responses to the concerns outlined in our May 10, 1997 letter. We are disappointed, however, with the BLM decision to forego requirements of definitive groundwater modeling to predict the extent of the effects of coal bed methane (CBM) dewatering activities as part of the evaluation of environmental impacts. This is particularly disappointing relative to the CBM overlap zone with predicted drawdowns from coal mining activities.

The proposed additional monitoring wells may provide some insight on the lateral extent of CBM dewatering effects, as suggested by BLM responses. Kennecott Energy will closely review the data forthcoming from those wells.

One response stated that Dr. Leon Borgman's study on differential CBM and coal mining groundwater effects, referenced in the EIS, should be published by September 1, 1997. Kennecott Energy Co., would like to receive a copy of that report for review, or an address where a copy may be obtained. Thank you.

Sincerely,



Bob Green  
Environmental Manager

**Response to Letter 1, Kennecott Energy**

Thank you for your interest in this EIS process.

1. This comment was addressed in the Final EIS, page 39, response to comments 8-1 and 8-3. In addition, this ROD expands the monitoring network and requires the CBM operators to form a groundwater monitoring group. The group will be required to provide all monitoring data and complete a yearly drawdown map for BLM and the WYSEO. This will provide answers to some if not all of these concerns.
2. This study will be made available as soon as it is completed.



STATE OF WYOMING  
OFFICE OF THE GOVERNOR

JIM GERINGER  
GOVERNOR

September 26, 1997

Richard Zander, Asst. Area Manager  
Bureau of Land Management  
Buffalo Resource Area  
1425 Fort Street  
Buffalo, WY 82834

Re: Gillette South Coalbed Methane Project Final Environmental Impact Statement

Dear Mr. Zander:

On behalf of the State of Wyoming, please be advised that we have reviewed the referenced document. As minerals are a key component of the economic base of the State of Wyoming, we encourage the responsible development of those resources that provide revenue for many services including education, provided that development is sensitive to the needs of all parties and good environmental practices. We support approval of the proposed action.

I appreciate BLM's thorough assessment and concerted efforts to address all stakeholder's concerns. Thank you for the opportunity to comment.

Sincerely,

  
Paul R. Kruse  
Assistant Director  
Office of Federal Land Policy

PRK:ck

2

BUREAU OF LAND MANAGEMENT

97 SEP 30 PM 1:39

STATE CAPITOL  
CHEYENNE, WY 82002

Response to Letter 2, State of Wyoming

Thank you for your interest in this EIS process.





# POWDER RIVER BASIN RESOURCE COUNCIL

23 North Scott • Sheridan, WY 82801 • (307) 672-5809  
P.O. Box 1178 • Douglas, WY 82633 • (307) 358-5002

October 4, 1997

Richard Zander, Assistant Area Manager  
Bureau of Land Management  
Buffalo Resource Area  
1425 Fort Street  
Buffalo, WY 82834

RE: Comments on the Final EIS for the Gillette South Coalbed Methane Project

Dear Mr. Zander:

Thank you for the opportunity to comment on the above referenced matter. The Powder River Basin Resource Council is a grassroots group of individuals dedicated to good stewardship of Wyoming's natural resources. We seek to foster responsible development consistent with the preservation of Wyoming's agricultural heritage and rural lifestyle.

The BLM's final Environmental Impact Statement for the Gillette South Coalbed Methane Project fails to meet the requirements of the National Environmental Policy Act because it does not adequately address the specific impacts the project will cause nor does it reasonably explore all available alternatives. Of particular concern to our membership is the failure to adequately address the impacts to the groundwater, the failure to continue modeling for these impacts so landowners and have some idea of the proposed impacts to the aquifer and the impacts of the produced water on the surface.

There are concerns raised by our organization and some in the coal industry concerning the overlapping impacts of coalbed methane and coal mining and the inability to determine or to delineate these impacts. The document fails to discuss or address recent problems concerning water wells North of Gillette that went dry and had to be re-drilled as a result of overlapping coalbed methane and coal mining impacts.

The document fails to address the specific impacts of the produced water flooding ranchlands and roads which has created problems for at least one landowner, so far, in operating their ranch. Nor does it address the problems presented moving livestock and running a ranching operation around the drilling rigs, pipeline construction, etc. This has become a problem.

The Final EIS fails to address the problem of where all the produced water can



recycled paper

4

go when reservoirs traditionally built years ago for spring run-off are now full year round and are spilling over. There are serious doubts about whether these stock ponds can hold the volumes of produced water that occurs as a by product of coalbed methane development. The document fails to analyze the potential for flooding of land due to inadequate reservoir construction, size or no reservoir at all.

5

It fails to address how impacts to groundwater and surface disturbance will be mitigated if the oil and gas operator goes bankrupt. Some landowners feel they are being pressured into development, without adequate compensation for surface disturbances and without a guarantee of water replacement. The additional approval of leasing of federal oil and gas minerals will only exacerbate this problem. The document does not adequately analyze the impacts to landowners under these circumstances nor does it properly provide for mitigation of surface and groundwater impacts.

6

The Final Environmental Impact Statement completely fails in the NEPA requirement to, "rigorously explore and objectively evaluate all reasonable alternatives..." or to take the required, "hard look" at all reasonable alternatives. This must be corrected and the BLM must look seriously at an alternative that requires reinjection of the groundwater to mitigate groundwater and surface impacts.

Finally, unless the BLM meets the requirements of the law the Record of Decision cannot implement the proposed action of drilling, completing, and operating approximately 400 coalbed methane wells, with 190 of those wells being on federal minerals. We sincerely hope the BLM will adequately address our concerns and meet the requirements of the law.

Sincerely,

*Bob Strayer*

Bob Strayer  
PRBRC Chair

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**Response to Letter 3, Powder River Basin Resource Council**

Thank you for your interest in this EIS process.

1. Please see comment letter 1, response number 1.
2. The wells in question were private domestic water wells that had been completed in the coal. The various environmental documents we have done have all stated that wells completed in the coal seam would be affected. For this reason, Western Gas Resources Inc. did replace the wells. The mitigation section of this ROD will require some type of similar action should water wells be impacted by CBM development.
3. The approved action requires operators on federal minerals to discharge water to locations which would provide maximum benefit to the landowner while avoiding sites which would result in adverse impacts. Normally this will be to a well-developed drainage. In this instance, the landowner requested the water disposal to go to a retention dam that had been constructed in a relatively flat area at the landowners request. When the volume of water exceeded the capacity of the dam, flooding occurred. The company has since corrected the problem by removing the water discharge point. CBM development is similar to conventional oil and gas development--wells must be drilled, production facilities installed, and pipelines laid. There is some interruption of ranching operations while this is occurring. Surface damage fees paid by the operator are meant to compensate the surface owner for these actions.
4. Please see response to comment number 3 of this letter.
5. Operators on federal minerals are required to post a performance bond. If they walk away from an operation or go bankrupt, this bond is used to plug and abandon the wells and reclaim the surface. No surface owner has come to the BLM saying they have been pressured into signing a surface owner agreement. Leasing minerals and signing surface owner access agreements has been occurring since at least 1920. This is not something new, although as happens when a new play is discovered, a rush occurs to obtain lease acreage. This normally drives up the compensation paid to the surface owner.
6. The proposal to reinject produced water was addressed on page 13 of the final EIS.

PRAIRIE SPRINGS RANCH  
ALEX & LAUREL MCCOUL

BUREAU OF LAND MANAGEMENT  
PO BOX 160  
GILLETTE, WY 82401

97 OCT -6 PM 1:10

October 3, 1997

Richard Zander  
Assistant Area Manager, BLM

Dear Mr Zander,

This letter is in response to the EIS material from you which I received yesterday. We are landowners and ranchers south of Gillette and have been unfortunate enough to be involved in the coal bed methane project. In our experience, the operators involved do not comply with surface agreements and are not willing to repair damaged roads, fences, or fields in a timely manner. Furthermore their use of large aboveground pipelines has made cattle and sheep herding an impossibility in some areas. These pipelines cannot be crossed with pickups or all terrain vehicles, which led to the sale of one prime Angus bull and 150 running age range ewes which could not be herded due to the pipeline. This was a direct economic impact to the ranch production of \$34,000.

Some of the earlier impacts are listed on the attached complaint letter dated 7-24-97. These impacts, totalling \$21,600 per year, are caused by several defects in the execution of this project. In our surface agreement, it states that the discharge water will be "allowed on SUBJECT LANDS and utilized in the most beneficial way as might be reasonably possible with the least amount of surface disturbance. Whenever possible the produced water is to be discharged directly into an existing drainage system or reservoir. All water produced and discharged from OPERATOR'S producing wells shall be done so under the strict supervision, rules and regulations of the Wyoming State Engineer and the Wyoming Department of Environmental Quality." The execution differs significantly from the theory. Martens and Peck built two small cachements designed to hold up to 10 to 20 gallons per minute of discharge water. Chuck Peck told us that very little water would escape from the cachement. In fact, approximately 50 gallons per minute (1250 barrels per day according to Hollis Barrington of Western Gas) is being produced at each well head. At one discharge point two wells are discharging, a flow of approximately 100 gallons per minute. This has led to flooding of fields and roads, and stress on our lower dam. Todd Parfitt of Wyoming DEQ has defined this as a diffuse discharge, which is a violation of their rules. His solution is to pipe the discharge water to the neighbor's

place, and flood their field instead. This violates our surface agreement.

At this writing, we still have two roads in impassible condition and two fields with dead grass due to the huge discharges of water during 1997. The damaged areas of these fields will have to be reclaimed, and the roads repaired when they dry out enough. The water is not being piped to a drainage or reservoir on our property where it can be used in the most beneficial way as stated in our surface agreement. From the list of complaints of 7-24-97 only one item has been repaired. That is the broken gate post, which was broken off for approximately one year before being repaired by Western Gas personnel.

Drawing on our experience, I would strongly discourage any further development of this project. It is an expensive burden on the ranching community, and may make ranching in this area economically unfeasible as groundwater supplies are pumped to drainages going to South Dakota. If the project continues, all discharge water must be reinjected into the upper aquifer by gas producers. This preserves the water for future use, and at the same time eliminates the need for operators to pipe the discharge water to drainages and reservoirs, which they find to be a difficult task. Diffuse discharges and the damage they cause would no longer be a problem for landowners and the DEQ. Operators would be spending much less time in the field and in the courtroom on surface damage issues.

Sincerely yours,

*Laurel McCoul*  
Laurel McCoul

*Alex McCoul*  
Alex McCoul

BUREAU OF LAND MANAGEMENT

97 OCT -6 PM 1:10

Laurel McCoul  
7-24-97

COMPLAINTS regarding surface use by Western Gas/ Martens & Peck:

1. WELL SOUTH OF HOUSE

- Discharge water is not being piped to a natural drainage as is specified in the surface agreement. This is causing the field to be flooded, the grass to die, and the access road to this well to be flooded and impassable. The access roads were supposed to be kept in all weather condition. Since the access road is impassable, the hands are driving in the field causing a rutted area about 100 feet wide. Instead of fixing the problem, they now climb over a woven wire fence and walk to the well site.

-In the meeting in Gillette prior to startup of this phase of the project, Martens & Peck stated that discharge water would be piped up to one mile in order to get it into a natural drainage. In the case of this well, discharge water is being piped about 150 feet into a small reservoir which Martens and Peck constructed without our consent in the middle of a farm field. The resulting flooding and bog render to field to be unfarmable. We both told Chuck Peck that we wanted the water from this well piped to our existing reservoir, which is downhill and less than one mile from the well. The actual distance involved is approximately 2550 feet, more or less.

-If the operating company would do the trenching and provide the pipe and pumping for this discharge, we would be willing to waive the surface charge of \$765 ( \$5 per rod as stated in the agreement) for a thirty day construction period.

-According to SCS figures, this field is capable of producing 45 tons of feed in its present state. This is worth approximately \$3375 per year. If we were able to carry out our plans of renovating this field, production would increase to about 120 tons at an approximate value of \$9600 per year. In the long run, it is probably cheaper for the gas company to just fix the problem.



## 2. WELL EAST OF HOUSE

-Discharge water is being piped to a natural drainage, and this well is an excellent example of compliance with the surface agreement. Due to the amount of flow, the dam needs some heavy rock hauled to reinforce its overflow which is eroding. The dam will wash out if this is not taken care of.

## 3. WELL IN NORTH PASTURE

-Discharge water is not being piped to a natural drainage as is specified in the surface agreement. This is causing the farm field to be extensively flooded, the grass to die, and the access road to the west pasture to be flooded and impassable.

- Discharge water is being piped about 50 feet to a small reservoir which Martens and Peck constructed without our prior consent. The resulting flooding and bog render the field to be unfarmable. The reservoir does not constitute a natural drainage. We both told Chuck Peck that we wanted the discharge water from this well piped to the natural drainage which is very pronounced in this area. I personally rode with Chuck and showed him the drainage several times. It is approximately 1400 feet from this well which is less than one mile.

-If the operating company would do the trenching and provide the pipe and pumping for this discharge, we would be willing to waive the surface charge of \$420 (\$5 per rod as stated in the agreement) for a thirty day construction period.

- According to SCS figures, this field is capable of producing 105 tons of feed per year in its present state. This is worth approximately \$7875 per year. If we were able to carry out our plans of renovating this field, production would increase to about 150 tons at an approximate value of \$12,000 per year. Also in this case, in the long run it is probably cheaper for the gas company to just fix the problem.

## 4. WATER WELLS

There are two water wells in section 3 which need to be monitored. Martens & Peck stated that they would monitor the water levels in these two wells. They haven't been checked by the operator since the beginning of the project. We have had to lower our pump in the main well once since the project started, and may need to lower it again this year.

## 5. RECLAMATION

Strat hole sites have still not been bladed over and seeded. Need to locate all strat sites using the map and reclaim each one. Pipelines and well sites have not been seeded. If I have to do it, the reclamation

rates are as follows: Strat Sites \$500 each, Pipeline \$20 per rod, Well sites \$1500 each.

## 6. ROADS

-Scoria that is worn and bladed off of the main roadway needs to be replaced.

-Road needs to be recrowned due to ruts from heavy traffic. Martens and Peck stated that the road would be repaired when the construction phase was completed. It hasn't been done.

- Gate post in the field south of the house was broken off by production personnel. It needs to be replaced. It has been broken off for about 6 months.

- When water discharge problem is fixed in the south field, the pasture road needs to be repaired. In the interim, a gravel ford needs to be built across the stream, or a sump and culvert installed.

*Hand carried & discussed with  
Martens & Peck and Walter Gas  
Leland McLeod*

## **Response to Letter 4, Alex and Laurel McCoul**

Thank you for your interest in this EIS process.

1. Pipelines are buried as stated in the Proposed Action. Before this occurs, however, they must be assembled and pressure tested to assure no leaks occur. This is normal industry practice.
2. This problem occurred on private minerals/private surface and apparently began when the discharge water was placed in two small retention dams constructed in relatively flat areas to provide livestock water. When water production exceeded the capacity of the dams, flooding of the surrounding area occurred. This problem has been corrected by Western Gas Resources Inc. by moving the discharge points to locations of well developed drainages. If this discharge had been proposed on federal minerals we would not have permitted it in this manner. As stated in the "Mitigation Measures" section of the ROD, the discharge would have been required to go to a well established drainage.

On private minerals, BLM has no authority. Surface owner agreements on federal minerals are third party agreements which the BLM normally has no involvement with. We will try to help resolve problems if asked or when unacceptable environmental impacts are occurring because of mineral development. Development of federal minerals are governed by stipulations which are applied to APDs and subsequent approvals.